

# Astrobiology

## Current, Evolving and Emerging Perspectives

**Edited by**

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# Contents

|  |            |
|--|------------|
| <b>1. Following the Astrobiology Roadmap: Origins, Habitability and Future Exploration .....</b>   | <b>1</b>   |
| <i>Aubrie O'Rourke, Angela Zoumplis, Paul Wilburn, Michael D. Lee, Zhi Lee, Marissa Vecina and Kysha Mercader</i>  |            |
| <b>2. Are we There Yet? Understanding Interplanetary Microbial Hitchhikers using Molecular Methods .....</b>   | <b>33</b>  |
| <i>Alexander J. Probst and Parag Vaishampayan</i>  |            |
| <b>3. Detection of Organic Matter and Biosignatures in Space Missions .....</b>  | <b>53</b>  |
| <i>Zita Martins</i>  |            |
| <b>4. Microbial Life in Impact Craters .....</b>   | <b>75</b>  |
| <i>Charles S. Cockell, Gordon Osinski, Haley Sapers, Alexandra Pontefract and John Parnell</i>   |            |
| <b>5. Impact of Simulated Martian Conditions on (Facultatively) Anaerobic Bacterial Strains from Different Mars Analogue Sites .....</b>   | <b>103</b> |
| <i>Kristina Beblo-Vranesevic, Maria Bohmeier, Sven Schleumer, Elke Rabbow, Alexandra K. Perras, Christine Moissl-Eichinger, Petra Schwendner, Charles S. Cockell, Pauline Vannier, Viggo T. Marteinson, Euan P. Monaghan, Andreas Riedo, Pascale Ehrenfreund, Laura Garcia-Descalzo, Felipe Gómez, Moustafa Malki, Ricardo Amils, Frédéric Gaboyer, Keyron Hickman-Lewis, Frances Westall, Patricia Cabezas, Nicolas Walter and Petra Rettberg</i> |            |
| <b>6. Exploring Deep-Sea Brines as Potential Terrestrial Analogues of Oceans in the Icy Moons of the Outer Solar System .....</b>  | <b>123</b> |
| <i>André Antunes, Karen Olsson-Francis and Terry J. McGenity</i>   |            |
| <b>7. Exploring Microbial Activity in Low-pressure Environments .....</b>  | <b>163</b> |
| <i>Petra Schwendner and Andrew C. Schuerger</i>  |            |
| <b>8. Earth's Stratosphere and Microbial Life .....</b>  | <b>197</b> |
| <i>Priya DasSarma, André Antunes, Marta Filipa Simões and Shiladitya DasSarma</i>  |            |

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# Preface

We live in an exciting era of scientific exploration. The upcoming wave of new space missions is strongly focused on the exploration of Mars (with planned sample-return) and the study of the oceans in the icy moons of Jupiter and Saturn. Since its dawn, Humankind has often wondered whether we are alone in the Universe. In the next few years, research in the booming field of Astrobiology will bring us closer than ever to finally getting an answer.

Astrobiology combines approaches from Biology, Geology, Chemistry, and Planetary Sciences to study the origin and development of Life in the universe, and search for extinct and currently existing organisms in other worlds. Research in Astrobiology is heavily anchored on the study of microbes from terrestrial analogue sites. Gaining new insights into how life copes with such extreme conditions or whether such extremophiles can survive under extraterrestrial conditions is vital for future missions.

The last decades have brought remarkable scientific advances and have shattered our long-standing misconceptions about Life's diversity and resilience. As a result of the introduction, and increased use and sophistication of molecular-based approaches, we have now realized that microbial life thrives under several of the most extreme conditions present on Earth, many of which previously thought to be anathema to Life. The physical-chemical similarities shared between some of these sites and other parts of our Solar System has brought new hope to the possible existence of Life on Mars or in the oceans of several icy moons of the outer Solar System (namely Europa and Enceladus). Microbes are now known to survive exposure to space travel, and even impact events.

The pervasiveness and new-found resilience of microbes raise some unexpected challenges. They can pose serious contamination risks associated with space missions, which might compromise results of experiments looking for the detection of organic matter and biosignatures-evidence of present or past life in other worlds. In a more extreme scenario, transport of microbial hitchhikers and contamination of other worlds could lead to the collapse of entire ecosystems before we even know that they exist.

This book combines the views of several leading experts across the globe and provides a current overview of this exciting cross-disciplinary research field. Its publication is rather timely, given the increased visibility and relevance of this area, and the upcoming wave of challenges and opportunities resulting from the new age of exploration of our Solar System.

I would like to take this opportunity to acknowledge Hugh Griffin, from Caister Academic Press, not only for challenging me to edit this book but also for his helpful support throughout the whole process. I thank all authors and reviewers for their availability to contribute to this process and for working together to producing such a remarkable book. Finally, I would also like to thank my family for their undying encouragement throughout the years, and my beloved wife Marta for her unwavering support and help in putting this project together.

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